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KARYOTYPES OF FIVE SPECIES OF CUBAN LIZARDS

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In August 1988, we obtained several species of lizards from the Guantanamo Naval Base, Guantánamo (formerly Oriente) Province of Cuba. All but two individuals of these lizards were returned to the laboratory at Texas Tech University, and we prepared karyotypes from testes or bone marrow according to the procedures of Porter and Sites (1986). The remaining two lizards were karyotyped from tissue cultures (Sites *et al.*, 1979) in the laboratory of Michael W. Haiduk at Lamar University. The lizards studied included four species of the iguanid genera *Leiocephalus* and *Anolis,* and one species of the teiid genus *Ameiva.* All specimens are deposited as vouchers in the herpetology collection at Texas Tech University. The karyotypes of these species are described below.

Leiocephalus.—Representatives of two species of this genus both had 12 metacentic macrochromosomes, but differed in the number of microchromosomes. Three females of *L. carinatus* had a diploid number of 34, with 22 microchromosomes (Fig. 1A).

Five individuals of *L. raviceps* (four males and one female) were examined, and all had 18 microchromosomes and a diploid number of 30 (Fig. 1B, C). In the males (Fig. 1B), one microchromosome was considerably smaller than any of the others. Examination of more than nine diakinesis cells from three of the four males showed that this chromosome formed a heteromorphic bivalent with a larger microchromosome (Fig. 2A). Secondary spermatocytes had a haploid number of 15 (Fig. 2B). The single female examined of this species (Fig. 1C) had the same

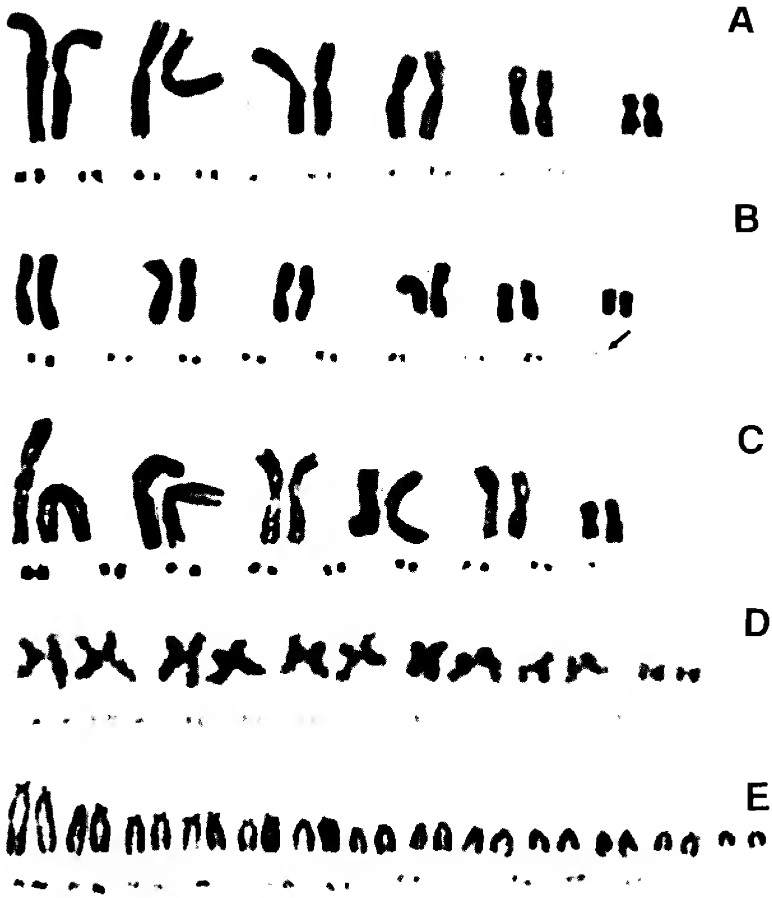

FIG. 1—A) Karyotype of female *Leiocephalus carinatus*; B) karyotype of male *Leiocephalus raviceps* showing the heteromorphic pair of sex chromosomes (arrow); C) karyotype of female *Leiocephalus raviceps*; D) karyotype of male *Anolis porcatus*; E) karyotype of female *Ameiva auberi*.

number of microchromosomes as the males, but did not have the unusually small microchromosome. These data suggest that *L. raviceps* has an XX/XY sex chromosome system, with the Y chromosome being minute, as has been reported in several species of the sceloporine genera *Uta* (Pennock *et al.*, 1969) and *Sceloporus* (Cole, 1971*a*, 1971*b*, 1978). The minute Y was seen in some of the secondary spermatocytes examined from males of this species. The remainder of the spermatocytes presumably possesed

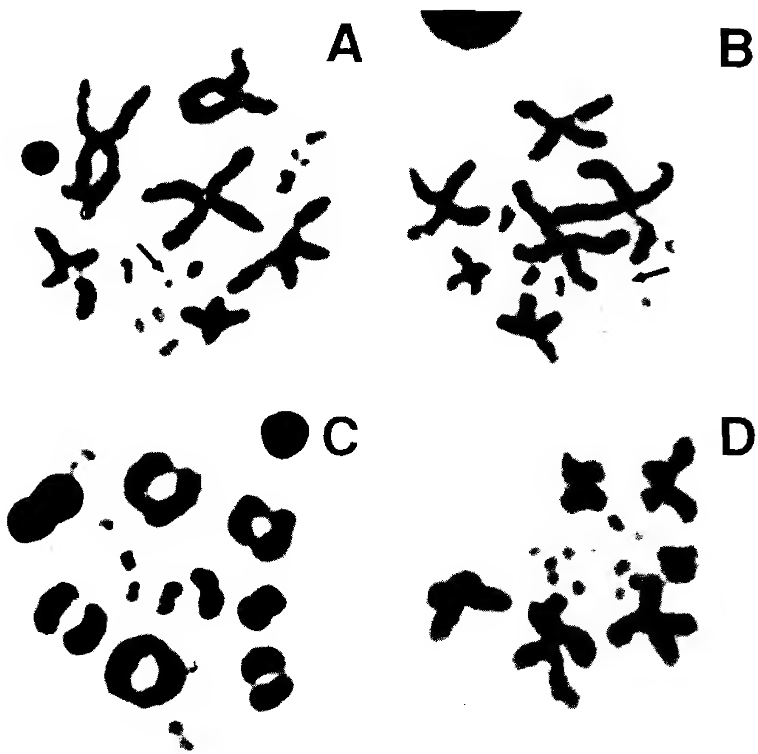

FIG. 2—Meiotic cells from male lizards. A) Diakinesis of *Leiocephalus raviceps* (the heteromorphic sex bivalent is indicated by an arrow); B) secondary spermatoctye from *Leiocephalus raviceps* (the presumed Y chromosome is indicated by an arrow); C) diakinesis of *Anolis homolechis*; D) secondary spermatocyte from *Anolis porcatus*.

the larger X chromosome, which is not distinguishable from the autosomal microchromosomes. Neither Gorman *et al.* (1967) nor Paull *et al.* (1976) mentioned sex chromosomes in other species of *Leiocephalus*, but slight heteromorphism in the microchromosomes easily might have been overlooked, and the heterogametic sex may not have been karyotyped in some cases.

Gorman *et al.* (1967) reported the karyotype of Haitian *Leiocephalus schreibersi* to consist of 12 metacentric macrochromosomes and 24 microchromosomes. Most iguanid genera that have been studied contain species with this 12 plus 24 karyotype, or a karyotype only slightly modified from that form. The 12 plus 24 karyotype is found in all of the major radiations of

iguanids, except the sceloporines, where all species (excluding the chromosomally diverse genus *Sceloporus*) have a 12 plus 22 karyotype. Some authors (Gorman *et al.*, 1967; Paull *et al.*, 1976; Bickham, 1984) have argued that the 12 plus 24 karyotype is ancestral for the family Iguanidae (and perhaps the entire suborder), although others (Cole, 1970, 1971*b*; King, 1981) have expressed differing opinions.

All *Leiocephalus* species karyotyped to date have 12 metacentric macrochromosomes, and the same pattern is found in other tropidurine genera such as *Tropidurus* and at least some members of the genus *Liolaemus* (Paull *et al.*, 1976; Peccinini-Seale, 1981). *Leiocephalus* karyotypes vary from the basic iguanid pattern only in the number of microchromosomes.

Paull *et al.* (1976) reported unpublished data of W. P. Hall from four unspecified species of *Leiocephalus.* Hall confirmed the *L. schreibersi* karyotype in at least one other Hispaniolan species, but "found representatives of the Cuban branch of the genus" to have only 20 microchromosomes. Paull *et al.* (1976) did not indicate which Cuban species were karyotyped by Hall, but based on the karyotype, it would appear that neither of the two species examined by us were included in Hall's studies.

Anolis.—We karyotyped two species of *Anolis*, and confirmed the karyotypes reported for these species by Gorman and Atkins (1968). Three male *A. homolechis* were examined, and all showed a 2n = 28 karyotype with 14 biarmed macrochromosomes, and 14 microchromosomes. This karyotype was determined primarily from diakinesis cells, which had 14 bivalents (Fig. 2C).

One male *A. porcatus* had a 2n = 36 karyotype with 12 biarmed macrochromosomes, and 24 microchromosomes (Fig. 1D). This karyotype is common among the alpha *Anolis* (Gorman *et al.*, 1967; Gorman and Atkins, 1968; Gilboa, 1975). No diakinesis arrays were found from this individual of *A. porcatus*, but haploid secondary spermatocytes showed the expected n = 18 karyotype (Fig. 2D).

Ameiva auberi.—We karyotyped one juvenile female of this species, and found a diploid number of 50, as in all other members of the genus that have been karyotyped (Matthey, 1933; Gorman, 1970, 1973; Gilboa, 1975). The 13 largest chromosome pairs in *Ameiva* are classified as macrochromosomes, although the size difference between macrochromosomes and microchromosomes is not particularly distinct. The karyotypes of *Ameiva* species differ only in the number of biarmed chromosomes.

Gorman (1970) hypothesized that the all-acrocentric karyotype of the mainland species *Ameiva ameiva* is ancestral for the genus. The same karyotype also is found in *A. exsul* from Puerto Rico (Gorman, 1970). However, other Caribbean *Ameiva* that have been studied have partially biarmed karyotypes, and the biarmed condition is apparently restricted to species from the West Indies (Gorman, 1970; Gilboa, 1975; Peccinini-Seale, 1981). In two Caribbean species (*A. dorsalis* from Jamaica and *A. maynardi* from the southern Bahamas), only the two largest pair of chromosomes are biarmed, whereas in the Hispaniolan species *A. chrysolaema*, pairs 1, 5, and 8 are biarmed (Gorman, 1970).

We examined six cells from the Cuban *A. auberi*, and found that the five largest pair are biarmed, as well as three smaller pair of macrochromosomes, which we designated as pairs 7, 9, and 12 (Fig. 1E). Gorman (1970) suggested that the Caribbean radiation of the genus was derived from South American taxa having an entirely acrocentric karyotype, and that pericentric inversions arose in different combinations on the various islands. If this interpretation is correct, it would appear that *A. auberi* has rearranged its karyotype more extensively than other Caribbean *Ameiva* thus far studied.

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